REMARKS

Claims 1 to 26 are pending in this application; of which, claims 1, 12, 16, 22 and 24 are the independent claims. Favorable reconsideration and further examination are respectfully requested.

Applicants acknowledge the Examiner's indication that claims 12 would be allowable if rewritten in independent form including the base claim and any intervening claims. Accordingly Applicants have amended claim 12 to include the limitations of claims 1 and 8 to 11.

Applicants note that the Office Action dated June 5, 2007 does not reject claim 15 in any of the pages of the Office Action other than the coversheet. Applicants assume that claim 15 is allowable. If claim 15 is not allowable, Applicants respectfully submit that the next office action *must* be a non-final action since claim 15 has not been properly rejected once so that any rejection with respect to claim 15 in the next action would be a new ground of rejection (see MPEP §706.07(a)).

Claims 1 to 11, 13, 14, 22 and 23 were rejected under 35 U.S.C. § 102(b) as being anticipated by Bruce et al. ("Real-Time Randomized Path Planning for Robot Navigation" hereinafter "Bruce").

Amended claim 1 is directed to a method of planning at least one path for an object in a state space from a starting position to a goal position to avoid a plurality of static and/or dynamic objects. The method includes (a) associating predetermined attributes with the plurality of static objects and/or the plurality of dynamic objects located in the state space. The state space is a

probability space. The method also includes (b) generating a probabilistic tree in the state space including a plurality of branches extending from the starting position of the vehicle towards the goal position located in the state space and (c) extending the plurality of branches of the probabilistic tree towards the goal position located in the state space based on a plurality of random tree extension rules and a plurality of deterministic tree extension rules until satisfying a predetermined stopping condition and (d) evaluating at least a first branch of the plurality of branches of the probabilistic tree for determining whether the first branch of the plurality of branches of the probabilistic tree satisfies predetermined trajectory path constraints.

The applied art is not understood to disclose or to suggest the foregoing features of claim 1. In particular, Bruce does not disclose or suggest extending the plurality of branches of the probabilistic tree towards the goal position located in the state space based on a plurality of random tree extension rules and a plurality of deterministic tree extension rules until satisfying a predetermined stopping condition (emphasis added).

The Examiner has identified column 2, lines 17 to 30 and column 5, lines 3 to 15 of Bruce as showing extending the plurality of branches using deterministic tree extension rules and random tree extension rules (see page 8 of the Office Action dated June 5, 2007). As understood by Applicants, it is unclear which of the two sections in Bruce cited by the Examiner addresses a plurality of random tree extension rules. Furthermore, even if deterministic tree extension rules and random tree extension rules are disclosed neither of these rules is applied together to disclose extending the plurality of branches of the probabilistic tree towards the goal position located in the state space. Moreover, Bruce does not disclose or suggest that the state space is a probability

space. Therefore, Applicants respectfully submit that Bruce does not disclose or suggest extending the plurality of branches of the probabilistic tree towards the goal position located in the state space based on a plurality of random tree extension rules and a plurality of deterministic tree extension rules until satisfying a predetermined stopping condition.

Claim 22 is directed to a method of adaptive path planning for a vehicle. The method includes defining a state space for the vehicle and a plurality of objects. The state space is a probability space. The method also includes setting a root node to initial state for the vehicle, generating a plurality of paths comprising node-to-node branches from a vehicle start location to a goal location. Each node is a probability distribution. The method further includes examining each of the branches to determine whether stopping conditions are satisfied, generating first ones of the branches using deterministic rules, generating second ones of the branches using random extension rules, determining whether first ones of the plurality of branches should terminated; and selecting a first one of the plurality of paths that extend to the goal location.

The applied art is not understood to disclose or to suggest the foregoing features of claim 22. In particular, Bruce does not disclose or suggest that the state space is a probability space or that each node is a probability distribution as recited in claim 22 (emphasis added, see page 6, line 7 to page 7, line 13 of Applicants' specification).

Bruce does not disclose or suggest that the state space is a probability space. As understood by Applicants, Bruce in determining Distance between states uses a state space that is a Euclidean space (see column 4, lines 8 to 47 of Bruce). Thus, each node represents a point in space in Bruce rather than a probability distribution. Therefore,

Bruce does not disclose or suggest that the state space is a probability space or that each node is a probability distribution.

Claims 16 to 18 and 20 were rejected under 35 U.S.C. §102(b) as being anticipated by Hsu et al. ("Randomized Kinodynamic Motion Planning with Moving Obstacles" hereinafter "Hsu"). Claims 19 and 21 were rejected under 35 U.S.C. § 103(a) as being obvious over Hsu in view of LaValle et al ("Randomized Kinodynamic Planning" hereinafter "LaValle").

Amended claim 16 is directed to a path planning method for a vehicle. The method includes defining a state space including an initial start position and a goal position, generating a plurality of paths from the start position to the goal position over time on a node by node basis based upon a set of rules including a deterministic rule, a randomness rule, and a probabilistic rule, assigning locations to objects in the state space over time based upon respective probability distributions and selecting a first one of the generated plurality of paths. The state space is a probability space.

The applied art is not understood to disclose or to suggest the foregoing features of claim 16. In particular, Hsu does not disclose or suggest generating a plurality of paths from the start position to the goal position over time on a node by node basis based upon a set of rules including a deterministic rule, a randomness rule and a probabilistic rule (emphasis added).

As indicated by the Examiner, Hsu, at page 2 lines 5 to 29, discloses generating a probabilistic roadmap (see page 7 of the Office Action dated June 5, 2007). As understood by Applicants, Hsu does not disclose or suggest random rules or even

deterministic rules much less generating a plurality of paths from the start position to the goal position over time on a node by node basis based upon a set of rules including a deterministic rule, a randomness rule and a probabilistic rule.

Claims 24 to 26 were rejected under 35 U.S.C. § 103(a) as being obvious over Hsu.

Amended claim 24 is directed to a system to plan a path to a vehicle. The method includes a workstation including a processor coupled to a memory containing instructions to enable the step of defining a state space for the vehicle and a plurality of objects. The state space is a probability space. The instructions also enable the steps of setting a root node to initial state for the vehicle and generating a plurality of paths including node-to-node branches from a vehicle start location to a goal location. Each node is a probability distribution. The instructions also enable the steps of examining each of the branches to determine whether stopping conditions are satisfied, generating first ones of the branches using deterministic rules, generating second ones of the branches using random extension rules, determining whether first ones of the plurality of branches should terminated and selecting a first one of the plurality of paths that extend to the goal location.

The applied art is not understood to disclose or to suggest the foregoing features of claim 24. In particular, Hsu does not disclose or suggest that the state space is a probability space (see, for example, page 6, lines 18 to 20 of Applicants' specification). Hsu discloses a state space, but Hsu does not disclose or suggest that the state space is a probability space (see

pages 8 to 10 of Hsu). Rather, as understood by Applicants, Hsu's state space is directed to geometric space with respect to robot motion than a probability space.

For at least the foregoing reasons, Applicants request withdrawal of the art rejections.

Applicants submit that all dependent claims now depend on allowable independent claims.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for withdrawing the prior art cited with regards to any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Applicants submit that the entire application is now in condition for allowance. Such action is respectfully requested at the Examiner's earliest convenience.

All correspondence should be directed to the address below. Applicants' attorney can be reached by telephone at (781) 401-9988 ext. 123.

Enclosed is a Petition for a One-Month Extension of Time and the corresponding electronic fee. No other fee is believed to be due for this Response; however, if any other fees are due, please apply such fees to Deposit Account No. 50-0845 referencing Attorney Docket: RTN-208PUS.

Respectfully submitted,

Date: 5 October 2007

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